

In The United States Court of Federal Claims

No. 00-705C

(Filed Under Seal: March 16, 2009)

Reissued: April 2, 2009¹

THE BOEING COMPANY,

Plaintiff,

v.

THE UNITED STATES,

Defendant.

- * Trial; 28 U.S.C. § 1498; Damages owing to
- * infringement of patent by NASA in
- * developing super lightweight external tank for
- * Space Shuttle; Hypothetical licensing
- * agreement; *Georgia Pacific* factors;
- * Reasonable royalty rate; Impact of prior
- * licensing agreements involving same patent;
- * Royalty base; Entire market value rule;
- * Reliance on prior licensing agreements;
- * Prejudgment interest; Compounding of
- * interest.

OPINION

Arthur M. Lieberman, Ganfer and Shore, LLP, New York, NY, and *Keith D. Nowak*, Carter, Ledyard & Milburn LLP, New York, NY, for plaintiff.

Ken B. Barrett and Trevor M. Jefferson, United States Department of Justice, Washington, D.C., with whom was Assistant Attorney General *Gregory G. Katsas*, for defendant.

ALLEGRA, Judge:

This case is before the court following a trial in Washington, D.C. and New Orleans, Louisiana. In this patent case, the Boeing Company (Boeing) seeks compensation from the United States, under 28 U.S.C. § 1498(a), for the unlawful use of U.S. Patent No. 4,840,682 (the ‘682 patent), which is directed to the low temperature underaging of aluminum lithium alloys. In two prior opinions, this court construed the ‘682 patent, found it valid, and held that the United States, through the National Aeronautics and Space Administration (NASA), had infringed the patent when it employed the underaging technique in manufacturing parts of the Space Shuttle. *See The Boeing Co. v. United States*, 69 Fed. Cl. 397 (2006) (*Boeing II*) (validity and

¹ An unredacted version of this opinion was issued under seal on March 16, 2009. The opinion issued today incorporates the majority of the parties’ proposed redactions and corrects some minor typographical errors. The redacted material is represented by brackets [].

infringement opinion); *The Boeing Co. v. United States*, 57 Fed. Cl. 22 (2003) (*Boeing I*) (*Markman* opinion). In this third installment, the court determines the amount of damages and prejudgment interest owed by defendant to plaintiff.

I. FINDINGS

Based upon the record, including the parties' stipulation of facts, the court finds as follows:

In the 1970s and 1980s, prompted by high jet fuel prices, Boeing began to investigate ways to reduce the structural weight of its airplanes to make them more fuel efficient. It knew that there were three main ways to do this – use lighter engines, alter the design of the airframe, or utilize improved structural materials. Prior to Boeing's efforts, the industry had focused primarily on the first two of these. In terms of structural materials, a combination of aluminum and steel had been used consistently on aircraft since the 1930s. However, by the early 1980s, advances in metallurgy led Boeing to conclude that aluminum alloys could play a major role in reducing the weight of airplanes.

For these purposes, lithium – the lightest metallic element – held the greatest potential as an alloying substance. Aluminum-lithium (Al-Li) alloys are lightweight, yet offer a high payload capacity, ostensibly a perfect match for Boeing. *See Boeing II*, 69 Fed. Cl. at 401-02. Historically, however, such alloys had been shunned by aircraft manufacturers because they tended to have poor “fracture toughness,” meaning that a crack in a part constructed of such alloys could very quickly propagate when stressed, potentially leading to a catastrophic failure. The industry's concerns stemmed, in part, from several well-publicized airline crashes in the 1950s that were attributed to poor fracture toughness.

To address this problem, Boeing experimented with several Al-Li alloys, varying the amount of time they were heat-treated (or “aged”) and adjusting their chemical composition by adding differing amounts of other elements, such as zirconium, magnesium, zinc, copper, and silicon. *See Boeing II*, 69 Fed. Cl. at 402-08 (describing, in greater detail, this development process). Eventually, Boeing found a composition that, when subjected to a heat-treatment process called “low-temperature underaging,” produced the desired mix of density and fracture toughness, making it suitable for aircraft structures.

Boeing applied for, and, on June 20, 1989, was granted a patent for this process. The patent so issued, the ‘682 patent, consists of seven claims, the latter six of which are dependent, in some fashion, upon the first. That first claim recites as follows:

A process for improving the fracture toughness of an aluminum-lithium alloy without detracting from the strength of said alloy, said alloy consisting essentially of:

<u><i>Element</i></u>	<u><i>Amount (wt. %)</i></u>
Li [Lithium]	1.0 to 3.2
Mg [Magnesium]	0 to 5.5
Cu [Copper]	0 to 4.5
Zr [Zirconium]	0.08 to 0.15
Mn [Manganese]	0 to 1.2
Fe [Iron]	0.3 max
Si [Silicon]	0.5 max
Zn [Zinc]	0.25 max
Ti [Titanium]	0.15 max

Other trace elements

Each	0.05 max
Total	0.25 max
Al [Aluminum]	Balance,

said alloy first being formed into an article, solution heat treated and quenched, said process comprising the step of aging said alloy article to a predetermined underaged strength level at from about 200° F. to less than 300° F.

Claim 7 of the patent reads “[t]he product produced by the process of Claim 1” and is a “product-by-process” claim, meaning that it covers any structure made by the process articulated in the first claim.

In 1991, Boeing granted three aluminum suppliers – Aluminum Company of America (Alcoa), Reynolds Metal Company (Reynolds), and Pechiney Rhenalu (Pechiney) – licenses to make products using the underaging process laid out in the ‘682 patent. Each of these licenses was retroactive to specified dates in 1989. Typical of the granting language in these licenses is the following taken from the Pechiney agreement: “Subject to the terms and conditions set forth herein, BOEING hereby grants to PECHINEY a nontransferable, nonexclusive license under the Licensed Property to use the Licensed Processes and to make and sell Licensed Products within the Licensed Territory.” Under each license, Boeing was entitled to a royalty of 1.25 percent of the “Net Sales Price of Each Licensed Product sold.” The Net Sales Price was defined as “the invoiced sale price (exclusive of prepaid freight charges, insurance, taxes, duties, and discounts actually allowed) of Licensed Products sold to a non-Affiliate Customer.” In the event there were no such sales, the agreements stipulated that an “Equivalent Sales Price” would be used to calculate the royalties due Boeing. That price was defined as “the manufacturing cost of each Licensed Product plus overhead and a reasonable profit.”

Around the time Boeing began working on Al-Li alloys to lighten its aircraft, NASA faced a similar task in seeking to reduce the weight of the Space Shuttle, officially called the Space Transportation System. The latter effort centered, in part, on the shuttle’s external tank – the large, brownish-orange tank upon which the orbiter sits during launch. That tank not only contains the propellant used by the orbiter’s main engines, but also functions as the structural

backbone of the spaceship during launch, providing support for the solid rocket boosters and the orbiter. NASA's efforts led to a redesigned external tank, known as the Lightweight Tank (LWT), which was about five tons lighter than the original Standard Weight Tank (SWT) – 75,569 versus 65,539 pounds.

In the late 1980s and early 1990s, NASA was planning the orbital laboratory that would become the International Space Station (ISS). Originally, the ISS was to orbit the Earth at an angle of inclination of 28.5 degrees, to coincide with the latitude of the NASA launch center at Cape Canaveral, Florida. But, when NASA agreed to build the ISS in partnership with the Russian Federal Space Agency, it had to adjust the orbit of the station to accommodate not only shuttles launched from Cape Canaveral, but also Russian spaceships launched from the Baikonur Cosmodrome in Kazakhstan. For reasons more fully explained in an earlier opinion, *see Boeing II*, 69 Fed. Cl. at 400, changing the orbital inclination of the ISS threatened to reduce significantly the shuttle's payload delivery capability for missions to the station. Left uncorrected, this problem, at the least, could have delayed the completion of the ISS, ballooning its cost. Seeking to reduce the weight of the shuttle, so as correspondingly to increase the payload that could be delivered, NASA engineers pondered a lengthy list of options that included reducing the crew size, redesigning the orbiter, and even using the powerful Saturn 5 rockets employed in the Apollo moon program. Eventually, though, a consensus arose that the best option was to further reduce the weight of the external tank.

On February 18, 1994, Lockheed Martin Space Systems Company (Lockheed) received contract NAS8-36200 (also known as the Buy 5 contract) to design this new external tank. Lockheed intended to use a relatively new Al-Li alloy, Alloy 2195, in the Weldalite family of aluminum alloys, to create a Super Lightweight Tank (SLWT).² This alloy offered many advantages: it was weldable, 30 percent stronger, and five percent less dense than the aluminum alloy used on the LWT. But, like other aluminum alloys, it still had a fracture toughness problem, particularly when deployed in the intricately-carved orthogrid configurations envisioned for the SLWT. In the spring of 1994, a "tiger team" of Lockheed and NASA employees traced the fracture weakness problem to the process used for tempering the alloy and, as reflected in a June 1994, report, then found a solution: low-temperature underaging. Using the alloy in combination with this underaging process ultimately reduced the weight of the SLWT to 58,039 pounds, a full 7,500 pounds lighter than the LWT. This savings translated into an almost pound-for-pound increase in the shuttle's payload capacity. As reflected in a Lockheed summary of the SLWT program, that increased capacity not only made the ISS program once again viable, but

² Martin Marietta, Lockheed's corporate predecessor, had granted licenses to Reynolds to: (i) produce Weldalite alloys, (ii) use the Weldalite trademark, and (iii) engage in the cooperative development of related technology. Under these agreements, Reynolds was obliged to pay running royalties on the sales of Weldalite products, at rates ranging from [] percent, depending on the amount sold per year, with a minimum annual royalty of []. In 1993, these agreements were modified to increase gradually the amount of the minimum royalty paid by Reynolds and to impose more stringent reporting and sublicensing requirements.

also “provide[d] NASA with the capability to place heavier payloads into typical low altitude, low inclination orbits, or to place typical payloads into higher altitude, higher inclination orbits.” The first SLWT flew in a shuttle mission in 1998, and the SLWT continues to be used on the Space Shuttle to this day.

Meanwhile, in 1998, Boeing was embroiled in a dispute with [] over royalties due under the latter’s 1991 license for the ‘682 patent. Boeing alleged that [] owed it royalties because it had been practicing the patent in its role as a Lockheed subcontractor for the external tank production contract referenced above. Based on information gained in pursuing this dispute, Boeing came to believe that, under the same contract, Lockheed itself had been practicing the processes described in the ‘682 patent. In a letter dated April 20, 1998, Boeing accused Lockheed of this and described its ongoing dispute with []. In the letter, Boeing noted, by comparison, that Alcoa had a license to use the ‘682 patent, “ha[d] not disputed its obligation to pay royalties when due under its patent license” and, indeed, “timely paid such royalties for practicing our patented Low Temperature Underaging process in the performance of sub-contracts with your company under NAS8-36200.” Boeing offered Lockheed a license of the ‘682 patent, as follows:

Based on information that we have learned from our FOIA requests and based on information that we have learned from [], we believe that your company has been and is practicing our patented Low Temperature Underaging process. Therefore, we hereby offer your company a patent license under our Low Temperature Underaging patents on terms and conditions which are similar to the existing patent licenses to Alcoa, Reynolds and Pechiney Rhenalu of France.

In letters dated April 21 and June 3, 1998, Lockheed did not acknowledge this offer and instead directed Boeing to take up any issue of infringement with NASA. Boeing eventually did just that, filing an administrative claim of infringement with NASA on August 19, 1998 (later supplemented on December 8, 1999). NASA denied that claim on February 10, 2000, averring that there was no infringement because Alloy 2195 differed from the alloys made according to the ‘682 patent both in chemical composition, as well as in the type of heat treatment used to increase the alloy’s strength and fracture toughness.

Unmollified, plaintiff filed its complaint in this court on November 21, 2000, alleging infringement by defendant of the ‘682 patent. A *Markman* hearing was held on May 13, 2003, at which the meaning of various elements in the ‘682 patent was explored. An opinion construing those elements was issued on June 20, 2003. *Boeing I, supra*. On November 15-19, 2004, the court conducted a trial focusing on the validity of the ‘682 patent and whether NASA had infringed that patent. Following post-trial briefing, on December 23, 2005, the court issued an opinion in which it held that “the ‘682 patent is valid, that defendant had no license to practice that patent, and that defendant’s use of the ‘682 patent in constructing the external tank of the Space Shuttle constituted infringement.” *Boeing II*, 69 Fed. Cl. at 431.

Following additional discovery, a trial on damages began on October 15-16, 2007, in Washington, D.C., and then continued on November 8, 2007, in New Orleans, Louisiana. At trial, plaintiff called Dr. Warren Hunt, Jr., the Executive Director of the Minerals, Metals, and Materials Society, who testified as an expert regarding the process of aging alloys. Dr. G. Hari Narayanan, a scientist employed by Boeing, and one of the inventors of the process covered by the '682 patent, testified regarding his work that led to the '682 patent. Lynn Hess, a retired Boeing attorney who specialized in intellectual property, testified regarding the licensing of the '682 patent, particularly to Alcoa. Paul Meyer, of Navigant Consulting, Inc., testified as an expert on the valuation of intellectual property and the reasonable royalty methodology for determining royalty damages. Jerry Smelser, a retired Lockheed employee who led the redesign of the external tank, testified regarding the contract for the SLWT, as well as the exact nature of the product to be delivered thereunder. Finally, testimony was received from Mara Leff, a paralegal who prepared a spreadsheet analyzing the chemical trace packages that tracked the underaging of the individual parts of the external tank.

Defendant called only one of plaintiff's witnesses – Mr. Smelser. It also called its own expert, John Jarosz, an economist employed by Analysis Group, Inc., to offer a methodology for determining royalty damages. Additionally, Robert Delpidio and Lowell Howard, Lockheed employees at NASA's New Orleans-based Michoud Assembly Facility (MAF), where the SLWT is manufactured, both testified regarding Lockheed's performance under the SLWT contract and the procedures associated with the construction and delivery of the external tanks. They focused, in particular, on various bookkeeping and billing entries.

Plaintiff calculated damages for infringement of \$43,149,260, plus delay compensation, based on a 3.5 percent royalty rate on a royalty base of the entire tank, equivalent to \$1.24 billion. Defendant's calculation resulted in damages an order of magnitude smaller, with total damages estimated at \$4,182,412, plus delay compensation, based on a 1.25 percent royalty rate on a royalty base of the flight hardware alone, valued at \$334.6 million. Post-trial briefs were filed, and closing arguments were held on May 27, 2008.

II. DISCUSSION

Section 1498(a) of Title 28 authorizes a patentee to recover in this court "reasonable and entire" compensation from the United States for its or its contractor's unlicensed use of a patented invention. Specifically, subsection (a) of that section provides, in relevant part:

Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner's remedy shall be by action against the United States in the United States Court of Federal Claims for the recovery of his reasonable and entire compensation for such use and manufacture.

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For the purposes of this section, the use or manufacture of an invention described in and covered by a patent of the United States by a contractor, a subcontractor, or any person, firm, or corporation for the Government and with the authorization or consent of the Government, shall be construed as use or manufacture for the United States.

28 U.S.C. § 1498(a); *see generally*, *Florida Prepaid Postsecondary Educ. Expense Bd. v. College Sav. Bank*, 527 U.S. 627, 648 n.11 (1999) (describing this waiver provision). While similar to provisions authorizing infringement actions against private parties, *see, e.g.*, 35 U.S.C. § 271(a), the waiver of sovereign immunity in section 1498(a) differs from those provisions in that it does not sound in tort, but rather authorizes an action analogous to one for a non-exclusive taking of a license under the Fifth Amendment. The latter purpose is evident in the statutory language that provides the patentee with “reasonable and entire compensation” for the use of its invention.³ Notwithstanding this difference, this court’s determination of liability under section 1498(a) relies on many of the same premises utilized by the district courts in assessing compensatory damages under Title 35. *See Standard Mfg. Co., Inc. v. United States*, 42 Fed. Cl. 748, 757-58 (1999).

“Generally, the preferred manner of reasonably and entirely compensating the patent owner is to require the government to pay a reasonable royalty for its license as well as damages for its delay in paying the royalty.” *Hughes Aircraft Co. v. United States*, 86 F.3d 1566, 1572 (Fed. Cir. 1996), *vacated on other grounds and remanded*, 520 U.S. 1183 (1997), *reinstated*, 140 F.3d 1470 (Fed. Cir. 1998); *see also Wright v. United States*, 53 Fed. Cl. 466, 469 (2002); *Standard Mfg. Co.*, 42 Fed. Cl. at 758. A reasonable royalty “may be based upon an established royalty, if there is one, or if not, upon the supposed result of hypothetical negotiations between the plaintiff and defendant.” *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1544 (Fed. Cir. 1995) (en banc) (citing *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078 (Fed. Cir. 1983)). “The hypothetical negotiation,” the Federal Circuit said in *Rite-Hite*, “requires the court to envision the terms of a licensing agreement reached as the result of a supposed meeting between the patentee and the infringer.” *Id.* That negotiation is deemed to have occurred at the time the United States takes a license from the plaintiff, that is, at the time the invention “is used or manufactured by or for the United States.” 28 U.S.C. § 1498(a); *see also Decca Ltd.*, 640 F.2d at 1166.

³ *See Zoltek Corp. v. United States*, 442 F.3d 1345, 1350-51 (Fed. Cir. 2006); *Motorola, Inc. v. United States*, 729 F.2d 765, 768 (Fed. Cir. 1984); *Decca Ltd. v. United States*, 640 F.2d 1156, 1166 (Ct. Cl. 1980); *Leesona Corp. v. United States*, 599 F.2d 958, 964 (Ct. Cl. 1979); *see also* Richard J. McNeely, “Governmental Indirect Patent Infringement: The Need to Hold Uncle Sam Accountable Under 28 U.S.C. § 1498,” 36 Cap. U. L. Rev. 1065, 1076-81 (2008); David R. Lipson, “We’re Not Under Title 35 Anymore: Patent Litigation Against the United States Under 28 U.S.C. § 1498(a),” 33 Pub. Cont. L.J. 243 (2003).

The royalty stemming from the hypothetical negotiation is often determined by reference to factors such as those set forth in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified and aff'd*, 446 F.2d 295 (2d Cir.), *cert. denied*, 404 U.S. 870 (1971); *see also Minks v. Polaris Indus., Inc.*, 546 F.3d 1364, 1372 (Fed. Cir. 2008); *Maxwell v. J. Baker, Inc.*, 86 F.3d 1098, 1109-10 (Fed. Cir. 1996); *Rite-Hite*, 56 F.3d at 1554-55. Using these factors (and others), the court must find the royalty rate and the base upon which that rate is to be applied. *Minks*, 546 F.3d at 1372. This requires a “highly case-specific and fact-specific analysis,” *Mars, Inc. v. Coin Acceptors, Inc.*, 527 F.3d 1359, 1366 (Fed. Cir. 2008), relying upon “mixed considerations of logic, common sense, justice, policy and precedent,” *Rite-Hite*, 56 F.3d at 1546; *see also Herbert v. Lisle Corp.*, 99 F.3d 1109, 1119 (Fed. Cir. 1996). To complete the damages calculation under section 1498(a), the court must also determine the amount of prejudgment interest needed to make the patentee whole. *See Waite v. United States*, 282 U.S. 508, 509 (1931); *Standard Mfg.*, 42 Fed. Cl. at 777; *ITT Corp. v. United States*, 17 Cl. Ct. 199, 232-33 (1989).

Before going further, it is necessary to ascertain the day on which the hypothetical agreement here would have been reached. August 15, 1994, most likely is that day. To begin with, 1994 is the year in which NASA entered into its contract with Lockheed to build the redesigned external tank. More importantly, it was during the spring of that year that the “tiger team” of NASA and Lockheed employees concluded that the solution to the problems being experienced with the fracture toughness of the 2195 parts was to drop the underaging temperature from 320° F. to between 290° and 295 °F. *See Boeing II*, 69 Fed. Cl. at 412. The report incorporating that recommendation was finalized on or about June 28, 1994. Although the record does not reveal precisely when that recommendation was adopted, it appears it was no later than August 15, 1994 – the last day that Lockheed could alter the specifications for the Aluminum Lithium Test Article, containing sample barrel panels and domes, which it was obliged to provide NASA under the contract. Hence, by no later than August 15, 1994, Lockheed was committed to using the lower temperature underaging to improve the fracture toughness of the 2195 parts and, in the court’s view, by that date had taken a license, as a contractor of the United States, to employ that process. *See* 28 U.S.C. § 1498(a). These same facts, of course, oblige the court to reject plaintiff’s claim that the hypothetical licensing would have occurred in 1998, the year the first SLWT was delivered to NASA.⁴

⁴ Less important, as it turns out, is determining whether the licensee in the hypothetical agreement should be deemed to be NASA or Lockheed. The parties shift back and forth on this point, depending upon which *Georgia-Pacific* factor is being examined. This is understandable as the *Georgia-Pacific* factors were not designed for cases against the United States under 28 U.S.C. § 1498(a). That said, because the latter subsection makes the United States liable for the authorized actions of its contractors, one can readily see how the United States might be viewed as liable for royalties paid by its contractors under a hypothetical license. As another judge on this court has elaborated –

Whether to treat the government or [its contractor] as the licensee for purposes of this analysis depends on the approach used and the factor involved. The contractor

In the segments that follow, the court will determine, *seriatim*, the royalty rate and base that would have been incorporated into this hypothetical 1994 agreement, as well as the framework for determining the amount of prejudgment interest owed plaintiff.

A. Royalty Rate

As noted, *Georgia Pacific* enumerated a “comprehensive list of evidentiary facts relevant, in general, to the determination of the amount of a reasonable royalty for a patent license . . . drawn from a conspectus of the leading cases,” 318 F. Supp. at 1120 – fifteen factors in all. These heuristics, though designed for cases involving private infringement, have been applied analogously to cases against the United States arising under section 1498(a). *See, e.g., Wright*, 53 Fed. Cl. at 469. In the latter instance, as in private infringement actions, it is rarely the case that all fifteen factors come into play and are matched with probative evidence; more commonly, owing to the general circumstances encountered or specific evidence presented, only a few factors predominate. *See Mobil Oil Corp. v. Amoco Chems. Corp.*, 915 F. Supp. 1333, 1353 (D. Del. 1994) (“In performing a hypothetical negotiation analysis, it is important to recognize that some of the *Georgia-Pacific* factors may be of minimal or no relevance to a particular case and other factors may have to be molded by the court to fit the facts of the case at hand.”); *Wright*, 53 Fed. Cl. at 475. Such is the case here.

The record reveals a series of transactions involving the “licensing of the patent in suit, proving or tending to prove an established royalty.” *Georgia Pacific*, 318 F. Supp. at 1120; *see also Minks*, 546 F.3d at 1372; *Maxwell*, 86 F.3d at 1109; *Breese Burners, Inc. v. United States*, 140 Ct. Cl. 9, 26 (1957). Such agreements “carry considerable weight in calculating a reasonable royalty rate.” *Unisplay, S.A. v. American Elec. Sign Co., Inc.*, 69 F.3d 512, 519 (Fed. Cir. 1995); *see also Studiengesellschaft Kohle, m.b.H. v. Dart Indus., Inc.*, 862 F.2d 1564, 1568 (Fed. Cir. 1988); 7 Donald S. Chisum, *Chisum on Patents* § 20.03[3][b][i] (2005) (citing additional cases). In separate transactions finalized in 1991, Boeing licensed the low temperature underaging process in the ‘682 patent to three aluminum manufacturers – Pechiney, Reynolds and Alcoa. In each of these license agreements, the licensee agreed to pay Boeing “a royalty measured at the

operates under the aegis of the sovereign’s power to take a license under the second paragraph of section 1498(a). . . . Hence, at some points in the analysis, it is more useful to treat the government as the hypothetical licensee. . . . In the context of a hypothetical negotiation, however, it is sometimes more appropriate to consider the hypothetical licensee to be the manufacturer of the product, rather than the government. . . . The *Georgia-Pacific* factors were postulated in the context of a private infringement action. As such, they do not always fit squarely in an analysis under section 1498.

Penda Corp. v. United States, 29 Fed. Cl. 533, 575 (1993); *cf. Standard Mfg.*, 42 Fed. Cl. at 764. For reasons that will become more apparent below, the court believes that the result herein is not significantly affected by who is deemed to have been the hypothetical licensee.

rate of 1.25 percent of the Net Sales Price of each Licensed Product sold.”⁵ Boeing contends that the royalty rates listed in these agreements were negotiated with its largest aluminum suppliers and do not represent the rate it would have charged Lockheed, one of its arch competitors. But, as defendant emphasizes, that claim is belied by a letter dated April 20, 1998, in which Boeing offered to license the ‘682 patent to Lockheed for the same royalty rate it had granted Alcoa, Reynolds and Pechiney – 1.25 percent of the Net Sales Price. Moreover, around this same time, specifically, on March 27, 1998, Boeing offered to assign []’s license to McCook Metals (McCook) if the latter would agree that []’s underaging process was covered by Boeing’s patent claims. This is significant as there is nothing in the record to suggest that Boeing had the same sort of supplier relationship with McCook that it had with Pechiney, Reynolds and Alcoa. Accordingly, it appears that Boeing was amenable to other parties, beyond its core suppliers, having a license of the ‘682 patent at the royalty rate of 1.25 percent. *See Atlantic Thermoplastic Co. v. Faytex Corp.*, 5 F.3d 1477, 1482 (Fed. Cir. 1993) (affirming a district court’s finding of a reasonable royalty rate based upon an offer made by the patentee to a third party). In the court’s view, of all the evidence presented in this case, these two offers, together with the three licenses Boeing granted its aluminum suppliers, constitute the most cogent and persuasive evidence of the fair and equitable royalty rate that should be employed here.

In arguing for a royalty rate of 3.5 percent, plaintiff relies heavily upon its expert, Mr. Meyer. He discounted the actual licenses of the ‘682 patent asserting that they were favorable arrangements negotiated before the benefits associated with the claimed invention were known. But, this view failed to account adequately for Boeing’s willingness to offer the same rate to Lockheed and McCook and to do so in 1998, well after the benefits of the patent were known. Likewise erroneous was Mr. Meyer’s claim that the 1.25 percent royalty rate in the ‘682 patent licenses was irrelevant because neither Alcoa, Reynolds nor Pechiney could have produced the infringing products. This observation was predicated on evidence that those parties could not have supplied finished hydrogen barrel panels because they lacked the metal rolling techniques needed to construct parts that would accommodate the necessary orthogrids. Debatable as this assertion may be, it is quite beside the point. What is relevant is that one or more of the suppliers could have treated panels manufactured by Lockheed or other NASA contractors using the low temperature underaging license – a fact confirmed by Lockheed product flow documents and by various letters that Boeing received from its aluminum suppliers. The record shows that, during the years in question, not only did Alcoa make royalty payments under its license – confirming

⁵ Boeing’s extended negotiations with [] and [] tend to contradict the notion, urged by defendant, that these agreements were lopsided. As various correspondence confirms, those negotiations began in 1988. []. In making the latter counteroffers, Boeing stated that it believed “the foregoing terms are reasonable in view of our multimillion dollar research program which led to this process and in view of the present and future use of this important process.” [] is also contradicted by its later dispute with [] over the payment of royalties under the license – a dispute that eventually led to the discovery that NASA (through Lockheed) had been using the ‘682 patent.

that it was employing the '682 patent method – but also that some of those payments related to its subcontracting activity under the SLWT contract.

As such, the court concludes that Mr. Meyer lacked any reliable basis upon which to distinguish the prior Boeing licenses of the subject patent and Boeing's offers to Lockheed and McCook. *See Riles v. Shell Exploration and Prod. Co.*, 298 F.3d 1302, 1313 (Fed. Cir. 2002) (rejecting expert models that erroneously "ignored [the patentee's] established licensing practice"); *Studiengesellschaft Kohle*, 862 F.2d at 1568 (rejecting a special master's rate that failed to give effect to the licensor's actual practice, stating that "[i]f the master had looked to [the licensor's] actual practices . . . the guessing game as to the economic value of the up-front payments would have been unnecessary"); *see also Stickle v. Heublein, Inc.*, 716 F.2d 1550, 1561-63 (Fed. Cir. 1983) (overturning royalty determination where "notably absent from [the court's] findings is any consideration of the actual negotiations between the parties"). On this ground alone, the court would be inclined to reject Mr. Meyer's royalty rate. But this was not the only deficiency in his approach.

Mr. Meyer asserted that the baseline for calculating the royalty rate should be [] percent, based upon a survey of 48 prior Boeing licenses. He based this finding on the fact that ninety percent of these licenses had royalty rates in excess of [] percent. The licenses in question were selected from a larger pool by Boeing's attorneys and involved a wide range of products with little resemblance to the underaging process at issue here. To be sure, a few of them involved metal processes, but others involved such things as a motor-driven rotary floor scrubber, a reamer, a hand-held wire stripper and a cleaning solvent. Despite the obvious differences in these products, Mr. Meyer made little attempt – certainly, not nearly enough – to analyze the comparability of these inventions to that of the '682 patent. There was no analysis of such common indicators as the degree of innovativeness of the technology transferred, how the particular invention stood in the marketplace, the relationship between Boeing and the licensee, the remaining duration of the patent, the extent to which the licensee had actually used the patent, and the impact of having multiple patents being covered by a single license.

Seeking to explain his nonfeasance, Mr. Meyer testified – "I knew that I couldn't drill into each of those licenses and have all the particulars and get to the – sort of the best comparables." But, there is no indication that Mr. Meyer could not make these comparisons – he simply failed to do so, even though Boeing almost certainly had significant information regarding each of these licenses in the survey. Yet, without these comparisons – and, indeed, with little idea as to how the original study group was populated⁶ – Mr. Meyer engaged in an extraordinary degree of

⁶ While Mr. Meyer was aware that Boeing's attorneys had excluded several categories of licenses from the survey (*e.g.*, licenses involving universities or joint ventures), the record, as a whole, does not support a finding that he directed the selection process. Indeed, in answering, during cross-examination, why Boeing's attorneys had excluded joint venture licenses, he disassociated himself from that process, stating – "Boeing was responsible for aggregating the licenses that were provided both to me and to you, and I believe that they – well they represented

speculation in assuming that the '682 patent was roughly comparable to the ninety percent of the patents in his sample that had a royalty rate in excess of [] percent, rather than the ten percent that had a rate below that level.⁷ Perhaps this might have made more sense had the royalty rates of all the patents been clustered around the [] percent mark – but, indeed, they were not, and instead ranged widely from a high of [] percent to a low of [] percent, with no discernable pattern. Mr. Meyer's approach then was not, as he claimed, "conservative." Rather, unfortunately, it is more aptly described as "capricious" – akin to valuing a painting by comparing it to ninety percent of the paintings hanging in the same gallery without knowing how the paintings came to be there and with little sense as to whether the painting to be valued is a Van Gogh or something bought at a starving artist's auction. Such an adventitious approach is "too speculative to stand" and "bear[s] little relationship to what a willing buyer and a willing seller would use in the real world to negotiate a royalty rate." *Dow Chemical Co. v. United States*, 226 F.3d 1334, 1348 (Fed. Cir. 2000).⁸

Since his baseline was little more than conjecture, it matters little how Mr. Meyer wielded the remaining *Georgia Pacific* factors in asserting that they resulted in upward or downward "pressure" on his initial postulate – plus or minus a guess, is, after all, still a guess. Yet, the court cannot let pass, without comment, two additional flaws in his adjustments.

First, Mr. Meyer attributed upward pressure to the notion that the use of the invention in the Space Shuttle program increased the value of the license. But, there is utterly no evidence – none – that either Lockheed or NASA would have agreed to pay a higher royalty rate not because of the profitability of the tank contract nor the intrinsic value of the patent, but because of the notoriety or "advertising value" associated with having the patent be used in the Space Shuttle program. If Mr. Meyer is right, then presumably NASA, with its grand history and high profile, ought to expect always to pay more in the way of royalties – even in hypothetical transactions, apparently. But this cannot be the case. For while defendant is not entitled to infringe a patent "at a cheaper rate than a private infringer," *Bendix Corp. v. United States*, 676 F.2d 606, 607-08 (Ct. Cl. 1982) (per curiam), surely it should not be required to pay a higher rate than is customary

to me that those licenses were taken out of that aggregation. So I would have to look to Boeing to describe what they did there."

⁷ Compare *Utah Med. Prods. Inc. v. Graphic Controls, Corp.*, 350 F.3d 1376, 1385 (Fed. Cir. 2003) (rejecting reliance on an expert report where the accused infringer failed to show that "the license agreements used in its expert analysis were in any way comparable to the . . . patent" in suit); *Georgia-Pacific*, 318 F. Supp. at 1140 ("Much, though not all, of the probative force of the foregoing evidence is dissipated by the radically different features and controlling circumstances pertaining to the compared but widely diverse products and the various respective licensors and licensees.").

⁸ While consideration of a hypothetical negotiation "necessarily involves an element of approximation and uncertainty," *Unisplay*, 69 F.3d at 517, an expert should be able to hazard something more than a guess, or at least show how, despite all reasonable efforts, his estimate is the best that could be derived.

simply because it is a highly-visible and desirable customer. As the Court of Claims instructed in *Bendix* –

Insofar . . . as the awards against the private infringer, and against the government taker, both would apply to the same unauthorized, unlicensed uses of a patented invention, and are both *nonpunitive*, and both undertake only to assess reasonable and entire compensation for the interest taken or infringed, the results ought to be similar, just as the awards in many land taking cases would have been no more or less if they had been trespass cases.

Id. (emphasis added). As this passage hints, given that an action under section 1498(a) finds its roots in the takings law, it would be odd to hold that the royalty rate must be increased to account for the government’s intended use of the patent, especially given the Supreme Court’s long admonition that the value of property taken by the government is “not enhanced by the purpose for which it is taken.” *United States v. Chandler-Dunbar Water Power Co.*, 229 U.S. 53, 76 (1913); *see also Dow Chemical Co.*, 226 F.3d at 1348; *Paymaster Techs., Inc. v. United States*, 61 Fed. Cl. 593, 611 (2004), *aff’d, in part, vacated, in part*, 180 Fed. Appx. 942 (Fed. Cir. May 4, 2006); and *see Leesona*, 599 F.2d at 969.

Mr. Meyer also erred in asserting that the royalty rate here should be increased to reflect the court’s ruling that the ‘682 patent is valid. While various decisions conclude that such an adjustment is warranted in setting damages for post-judgment infringement or the rate for prospective uses of the invention under an injunction, such is generally not the case where the court is faced solely with the prospect of determining a reasonable royalty rate for a hypothetical agreement that was to occur pre-judgment.⁹ The latter, of course, is the case here, as the court, under section 1498(a), is faced only with the issue of the royalties owed as to the SLWTs used for the 28 shuttle launches that occurred before the ‘682 patent expired. Moreover, while the record contains some indication that there were ongoing disputes among the parties as to the scope of the patent, there is no indication that the royalty rate in the prior licenses of the ‘682 patent was discounted to take into account the potential invalidity of the patent. Accordingly, there was no need for Mr. Meyer – or this court, for that matter – to correct for such a discount in determining the hypothetical royalty rate here.

⁹ *See Amado v. Microsoft Corp.*, 517 F.3d 1353, 1362 (Fed. Cir. 2008) (“Prior to judgment, liability for infringement, as well as the validity of the patent, is uncertain, and damages are determined in the context of that uncertainty.”); *Dynamics Corp. of Am. v. United States*, 766 F.2d 518, 519 (Fed. Cir. 1985), *aff’g*, 5 Cl. Ct. 591 (1984) (“a finding of validity is not entitled to any collateral effect”); *see also Paice LLC v. Toyota Motor Corp.*, 504 F.3d 1293, 1317 (Fed. Cir. 2007) (“[P]re-suit and post-judgment acts of infringement are distinct, and may warrant different royalty rates given the change in the parties’ legal relationship and other factors.”) (Rader, J., concurring); *Riles*, 298 F.3d at 1313 (“A reasonable royalty determination for purposes of making a damages evaluation must relate to the time infringement occurred, and not be an after-the-fact assessment.”).

Based on the foregoing, the court finds that plaintiff's model does not reflect the royalty rate that a hypothetical negotiation between Boeing and Lockheed would have yielded. Rather, based on the record as a whole, it finds that the hypothetical royalty rate should be 1.25 percent.¹⁰

B. Royalty Base

Both parties have expended considerable effort in arguing which parts of the external tank infringed the patent. This debate, heavily animated by conflicting expert testimony and disputes over test records, has focused on the temperatures at which these parts were aged and the lithium content of the alloys involved. Yet, despite these differences, both parties admit that the royalty base ought to reflect a significant portion of the value of the entire tank – and one that exceeds the value of the 2195 parts. Plaintiff sets that value at \$1.24 billion corresponding to the price of the tanks sold, while defendant, for its part, sets that value at \$334.6 million, corresponding to the price of the “flight hardware,” a quantity that, unlike plaintiff's, does not include any overhead or profit. In staking out their respective positions, both parties invoke permutations of the so-called “entire market value rule.” Plaintiff does so more directly, arguing that those parts of the SLWT made from Alloy 2195 were both physically and functionally inseparable from the non-infringing parts. Defendant, however, is more subtle – objecting to plaintiff's implementation of the rule, but ultimately noting that its own expert “effectively takes the entire market value rule into account because [he] includes all of the flight hardware in the ETs, not just patented items.”

The entire market value rule “permits recovery of damages based on the value of the entire apparatus containing several features, where the patent-related feature is the basis for customer demand.” *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573, 1580 (Fed. Cir. 1989). “This measure of damages arises where both the patented and unpatented components together are ‘analogous to components of a single assembly,’ ‘parts of a complete machine,’ or ‘constitute a functional unit’ but not where the unpatented components ‘have essentially no functional relationship to the patented invention and . . . may have been sold with an infringing device only as a matter of convenience or business advantage.’” *Imonex Services, Inc. v. W.H. Munzprufer Dietmar Trenner GMBH*, 408 F.3d 1374, 1379 (Fed. Cir. 2005) (quoting *Rite-Hite Corp.*, 56 F.3d at 1550).¹¹ Most commonly, the entire market value rule applies when the holder of the patent would have sold additional items had the patent not been infringed, allowing the patent holder to recoup lost profits on the sale-related items that the infringer should have reasonably foreseen would be lost. For example, in *Juicy Whip*, the Federal Circuit held that the patent holder was entitled to lost profits not only on the sale of a juice dispenser, but on the

¹⁰ The court has carefully examined both experts' analyses of the remaining *Georgia Pacific* factors – bearing on other features of the patent, the products to be produced thereby, the relevant marketplace and the bargaining positions of the parties – and is unpersuaded that the counteracting “pressures” identified by the experts warrant any further adjustment of this rate.

¹¹ See also *Juicy Whip, Inc. v. Orange Bang, Inc.*, 382 F.3d 1367, 1371 (Fed. Cir. 2004); John M. Skenyon, Christopher S. Marchese, John Land, *Patent Damages Law and Practice* § 2.5 (2008).

unpatented juice syrup, as well, finding that there was a “functional relationship” between the two items. 382 F.3d at 1372. A similar understanding of the rule was at work in *Golden Blount, Inc. v. Robert H. Peterson, Co.*, 438 F.3d 1354, 1370-72 (Fed. Cir. 2006), where the Federal Circuit held that the patent owner was entitled to lost profits on the artificial logs and grate support that were ordinarily sold with the patented burner assembly. *See also Gasser Chair Co. v. Infanti Chair Mfg. Corp.*, 943 F. Supp. 201, 215-19 (E.D.N.Y. 1996), *aff’d*, 155 F.3d 565 (Fed. Cir. 1998); Patent Damages Law and Practice, *supra* at § 2.5 (providing other examples). Nonetheless, several cases have invoked this rule in determining a reasonable royalty, operating on the theory that “a willing licensee in a hypothetical negotiation . . . would have been more disposed to agree to a high royalty if he could expect to derive [the] collateral benefits” of associated sales. Chisum, *supra*, at § 20.03[3][b][vi]; *see also Fonar Corp. v. General Electric Co.*, 107 F.3d 1543, 1552-53 (Fed. Cir.), *cert. denied*, 522 U.S. 908 (1997). Whether in the context of recouping lost profits or determining a reasonable royalty rate, it must be shown, for the rule to apply, that “the patented feature is the basis for customer demand for the entire machine.” *Fonar*, 107 F.3d at 1552; *see also Rite-Hite Corp.*, 56 F.3d at 1549.

Against this background, whether the rule applies here is a close call. To be sure, the shuttle parts produced with the patented process were integrated into the SLWT and thereby provided valuable assistance to Lockheed and NASA in reaching their weight reduction goals. Yet, one must wonder whether there was the sort of symbiotic or intrinsic relationship between the underaging process and the SLWT as would support a typical application of the entire market value rule. Again that rule is ordinarily invoked where there is some functional, economic or marketing dependence by the unpatented item upon the invention – some indication, for example, that the patented feature was the basis for the demand for the item that incorporates it.¹² Here, however, that nexus is not apparent, primarily because the external tank would have been built by Lockheed and sold to NASA whether *vel non* the underaging process of the patent was employed. Fortunately, though, this court need not decide whether this case is an appropriate vehicle for applying the entire market value rule because, based on the record, it finds that the value of the SLWT is integral to the determination of the royalty base here, albeit for a different reason.

¹² *See Minco, Inc. v. Combustion Eng’g, Inc.*, 95 F.3d 1109, 1118 (Fed. Cir. 1996); *Rite-Hite*, 56 F.3d at 1550, 1551; *TWM Mfg. Co., Inc. v. Dura Corp.*, 789 F.2d 895, 901 (Fed. Cir. 1986); *Wright*, 53 Fed. Cl. at 472 (the test is “whether the patented component cannot be operated independently of the non-patented components”). Especially instructive in this regard is *Leesona Corp.*, in which the Federal Circuit stated –

Under the entire market value rule, it is not the physical joinder or separation of the contested items that determines their inclusion or exclusion from the compensation base, so much as their financial and market dependence on the patented item under the standard marketing procedures for the goods in question.

599 F.2d at 969; *see also* 8 Irwin Aisenberg, *Modern Patent Law Precedent* E440 (2008).

And that reason is this – the various licenses of the ‘682 patent suggest that a hypothetical licensing agreement between Boeing and Lockheed would have defined the royalty base so as, in effect, to include therein the value of the SLWT. In each of these licenses, the royalty was set at 1.25 percent of the “Net Sales Price of each Licensed Product sold.” The phrase “Net Sales Price” was defined as –

the invoiced sales price (exclusive of prepaid freight charges, insurance, taxes, duties, and discounts actually allowed, if any, included therein) of Licensed Products sold to a non-Affiliate customer of [the licensee]. In the event there have been no such sales to non-Affiliates, or the transaction in question involves a lease instead of a sale, Equivalent Sales Price shall be used to compute the royalties due thereunder.

The agreements, with slight differences that are immaterial, further defined “Licensed Products” as “any products made by a Licensed Process or covered by the claims of” the patent. “Equivalent Sales Price” was defined as “the manufacturing cost of each Licensed Product plus overhead and a reasonable profit.”

These provisions beg the question – what was the Licensed Product sold here? There are two obvious responses – that the product was the specific parts that were underaged using the invention or that it was the entire external tank. Based upon the record, the latter appears to be the case for several reasons. For one thing, the original procurement contract for the SLWT, NAS8-36200, stipulates that, “the contractor shall . . . produce and deliver External Tanks” – in other words, the SLWT is what was sold here, not its separate components. Second, the DD-250s, the budget-tracking documents that Lockheed used, *inter alia*, to effectuate the transfer of the external tanks to NASA, refer specifically to the tanks and provide an estimated cost for each external tank. Contrary to defendant’s claim, these documents, as well as the weight of testimony in this case, make clear that at no point was NASA sold separately the individual barrel panels or other 2195 parts. Third, Lockheed produced “Unit Cost Reports” to reconcile the estimated cost of each tank against Lockheed’s total actual monthly costs – and, again, these reports were broken down on a per tank basis, further reinforcing the notion that both NASA and Lockheed conceived of this contract as one for the sale of external tanks. Finally, even defendant’s expert, Mr. Jarosz, agreed that, “consistent with the licenses that Boeing entered into prior to the hypothetical negotiation, the base here went beyond the price of the individual panels,” and included the “flight hardware,” which he defined as the cost of the tank less certain labor, overhead and indirect expenses. While Mr. Jarosz protested otherwise, in the end, even his royalty base was more in accord with the notion that the Licensed Product sold here was the entire SLWT.

Of course, Mr. Jarosz asserted that the cost of the SLWT had to be reduced substantially to get to the royalty base. He began by assuming that had Lockheed relied upon Alcoa or Reynolds to perform the underaging of the barrel panels, those manufacturers would have been required to pay the royalty only on the product they sold – namely, the parts of the tank that were underaged. To derive the value of those panels, Mr. Jarosz used what he described as a “multiple

step process.” He began with the total DD-250 cost of the SLWTs containing infringing parts, which totaled approximately \$1.24 billion. (Of course, that figure, together with an allowance for profit, is essentially what plaintiff claims is the royalty base here.) Mr. Jarosz, however, believed that this figure overstated the royalty base. He noted that the DD-250 costs included the labor costs associated with building the SLWT, engineering and tooling costs, various support costs, material costs, overhead and administrative costs, as well as facility operation and maintenance costs. Deducting these costs from the DD-250 cost led him to conclude that approximately [] percent of the DD-250 costs represented an estimate of the materials and subcontract costs of the SLWTs containing infringing aluminum-lithium parts, leading to a figure of []. To eliminate the cost of consumable materials that purportedly were used in building the tank but not incorporated therein, Mr. Jarosz then multiplied this figure by [] percent yielding the cost of the “flight hardware,” that is, the cost of all the materials that constituted the tank. In Mr. Jarosz’s view, the resulting figure – [] – overstated the value of the infringing parts, but, nonetheless, represented a reasonable royalty base for calculating damages here.

But, while Mr. Jarosz’s mathematics are relatively clear, the rationale for his calculations is much less so. For one thing, his tightly-constricted approach for determining the royalty base bears little relationship to either the licensing agreements of the patent in the record, or the offers made by Boeing to Lockheed or to assign Reynold’s license to McCook. While Mr. Jarosz relied heavily upon the latter documents as establishing a reasonable royalty rate, and while he claimed to rely on them in constructing his royalty base, he, in fact, made no attempt to reconcile his notion of “flight hardware” with the definition of the royalty base in those agreements. And for good reason, as nothing in the agreements suggests that the royalty base should be stripped of labor, overhead or a reasonable profit. *Per contra*. The definition of Net Sales Price excludes freight, taxes and a few other items not relevant here, but conspicuously does not exclude labor, overhead or profit. Moreover, the definition of Equivalent Sales Price, to be used as a default where the Net Sales Price cannot be derived, requires the inclusion not only of the “manufacturing cost” of the item (which the DD-250s and reconciling documents indicate includes the cost of labor) but also of “overhead and a reasonable profit.” Thus, there is no contractual foundation or other factual basis for using the stripped-down figure that Mr. Jarosz employed.¹³

¹³ In its post-trial briefs, defendant notes that, under the so-called “Buy 6” contract (the follow-on to the original contract), the flight hardware was “a separate component of the ET contracts.” It relies on a document entitled “Attachment J-19 Procurement of Buy 6 Flight Hardware” that was incorporated into the original Buy 5 contract by an amendment dated September 16, 1997. This document orders that, “all costs and fees associated with Attachment J-19 of this contract shall be collected, reported and invoiced separately from the remainder of this contract.” Defendant suggests that this demonstrates conclusively that, even under a definition of the royalty base culled from the prior license agreements of the ‘682 patents, the product sold was the flight hardware, not the entire tank. But, this claims proves too much. For one thing, it appears that the only reason that the flight hardware was accounted for in this fashion was to distinguish, for cost accounting purposes, between the tanks that Lockheed was

Mr. Jarosz's retort to this takes the form of a simple question – why would Lockheed agree to pay a royalty of 1.25 percent of the value of the entire tank, when it could have asked Alcoa or Reynolds to underage the parts and paid a much lower royalty under their agreements? Or to use the words from his report – “To the extent that NASA and Lockheed had a viable alternative of paying under existing licenses, which appeared to specify the base as the aluminum-lithium panels, NASA and Lockheed would have viewed the aluminum-lithium panels as the maximum royalty base in the hypothetical license.” But, this line of inquiry takes the concept of non-infringing alternatives too far – indeed, it threatens to replace the hypothetical agreement construct with a damages model in which government infringers seemingly are rewarded with the best licensing scenario conceivable. Further explanation of this point, of course, is warranted.

For good or naught, as the result of the taking, the hypothetical agreement here must be predicated upon what Boeing and either NASA or Lockheed would have agreed. To be sure, the prior supplier licensing agreements provide a paradigm for that hypothetical agreement, but the amount of royalties that the aluminum manufacturers would have actually paid thereunder does not cap defendant's liability here because defendant chose not to take advantage of those arrangements and instead took for itself (or Lockheed) a license of Boeing's patent. That is what 28 U.S.C. § 1498(a) presumes – and, in this regard, as in any other case of infringement, the court, in applying the hypothetical construct, takes the products sold by the hypothetical licensee as it finds them.¹⁴ What was sold under the taken license here was not parts – as might have been the case had Alcoa or Reynolds practiced the invention – but specifically-numbered external tanks (*e.g.*, ET-61, ET-62, etc.). And those are the products to which the royalty formula in the hypothetical agreement must be applied.

Defendant and its expert may not avoid this reality by picking and choosing among the basic terms of those agreements, selecting only those, such as the relatively low royalty rate, which are favorable to them, while discarding the rest. Indeed, it makes neither logical nor

still delivering under the Buy 5 contract and those that it was still to build under the Buy 6 contract. There is no indication that this change in cost accounting also reflected a change in the product being sold – to the contrary, that product remained the external tank, the price of which continued to reflect not only the flight hardware costs, but also all the other associated labor and overhead costs.

¹⁴ The Federal Circuit recently rejected the argument that “reasonably royalty damages are capped at the cost of implementing the cheapest available, acceptable, noninfringing alternative.” *Mars*, 527 F.3d at 1373; *see also Monsanto Co. v. Ralph*, 382 F.3d 1374, 1383 (Fed. Cir. 2004) (rejecting infringer's argument that “a reasonable royalty deduced through a hypothetical negotiation process can never be set so high that no rational, self-interested, wealth-maximizing infringer acting *ex ante* would have ever agreed to it”); *Chisum, supra*, at § 20.03[3][b][v]. As further stated by the Federal Circuit, “what an infringer would prefer to pay is not the test for damages.” *Rite-Hite*, 56 F.3d at 1555; *see also Golight Inc. v. Walmart Stores, Inc.*, 355 F.3d 1327, 1338 (Fed. Cir. 2004).

factual sense to suggest, as defendant does, that the royalty rate here should correspond precisely to the 1.25 percent rate in those agreements, yet argue that the royalty base should be defined in a fashion dramatically different from how it is defined in those licenses – a formulation that would significantly diminish the royalties recovered by Boeing. As noted by one commentator, “[t]he royalty base cannot be considered in a vacuum, and its interaction with the royalty rate constitutes the multiplied combination whose product is ‘royalties’ and thus ‘damages’ within the context of § 284.”² Robert Goldscheider, *Licensing and the Art of Tech. Mgmt.* § 18:5 (2008); *see also Bendix Corp.*, 676 F.2d at 612; *Gargoyles, Inc. v. United States*, 37 Fed. Cl. 95, 103 (1997) (“Generally speaking, the royalty rate and royalty base have an inverse relationship, so that when the base goes down the rate goes up, and vice-versa”). In short, the prior licenses provide guidance on what the hypothetical royalty rate **and** royalty base should be – a result strengthened by the fact that when Boeing extended its offers to Lockheed and McCook (the latter, in offering to transfer the [] license), it did not modify the definition of the royalty base. While Lockheed did not accept Boeing’s offer, there is certainly no evidence that it would have obtained a more favorable deal from its rival, particularly given the complexities associated with the royalty base offered by defendant.

Indeed, it is at this point that the highly competitive relationship between Boeing and Lockheed perhaps most logically rears its head. *See Georgia Pacific*, 318 F. Supp. at 1120. While the April 1998 offer contradicts the view that Boeing would have demanded a higher royalty rate from its competitor, it does suggest that, in any deal with Lockheed, Boeing intended to use the same definition of the royalty base it had used previously, presumably even if that meant that Lockheed would have to pay more royalties than it would have paid had the underaging services been performed by Boeing’s aluminum suppliers. In assuming the contrary, Mr. Jarosz not only hypothesized a different agreement than was ever offered, but also imagined that the underaging services would have been rendered by one of Boeing’s licensees, rather than the unlicensed firms that actually performed most of that work. In this regard, he simply went too far. Contrary to Mr. Jarosz’s theory, there is no indication that Boeing would have been willing to agree, in a license with either Lockheed or NASA, to a royalty base that required the sort of extrapolations that Mr. Jarosz performed to get to the cost of the “flight hardware.” Nor is it reasonable to believe that Lockheed would have been willing to share contemporaneously with Boeing the detailed operating cost data needed to make and verify that royalty calculation.

Based on the foregoing, the court finds that the royalty base here corresponds to the value of the external tanks that were sold to NASA and is not limited to some lesser permutation of the value of the parts that were underaged.¹⁵ To determine that base, the court must parse the

¹⁵ While the rationale employed here makes it unnecessary to address the failure of Lockheed’s subcontractors to maintain all the records associated with the underaging of the 2195 parts, there can be little doubt that this misfeasance ought to weigh against the defendant. *See Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1572 (Fed. Cir. 1996) (“When the calculation of damages is impeded by incomplete records of the infringer, adverse inferences are appropriately drawn.”); *Beatrice Foods Co. v. New England Printing & Lithographing Co.*, 899 F.2d 1171, 1175-76 (Fed. Cir. 1990) (same); Chisum, *supra*, at § 20.03[3][c][i].

definitions found in the supplier royalty agreements. There is no “Net Sales Price” here because, under this cost-plus, fees type contract, there was no separate invoicing for the tanks in question – NASA, in other words, did not pay on a per tank basis, but rather on a direct-billed, incurred-cost basis. As such, it would appear that the royalty base should correspond to the “Equivalent Sales Price” of each tank sold, again with that quantity defined as “the manufacturing cost of [the tank] plus overhead and a reasonable profit.” Based upon its review of the cost forms in the record, the court finds that the “manufacturing cost” should equal the cost of the flight hardware plus labor and overhead costs, and that, for this purpose, “overhead” should include management and administration costs, as well as other direct costs. To these figures must be added a figure corresponding to a “reasonable profit.” Under the Buy 5 contract, which covered virtually all the tanks in question, the profit figure, which was the composite of various award fees, essentially worked out to approximately [] percent of the other costs.¹⁶ The Buy 6 contract, under which the

¹⁶ This figure tracks a May 28, 2006, statement of operating profit prepared by Lockheed. While that report indicates a slightly higher overall profit on the external tank program [], the latter figure appears to include some tanks from the Buy 5 contract whose sale would have predated the hypothetical license. Because the sale of those tanks produced a profit rate of [] percent, excluding them from the calculation seemingly requires the court to adjust the overall profit percentage downward somewhat. The resulting [] percent profit figure used by the court is supported by testimony given by Jerry W. Smelser, a former NASA employee who led the development team that redesigned the external tank and was involved with the Lockheed contract. He testified:

Q: Do you recall [how] Lockheed was paid for the super lightweight tank?

A: The super lightweight tanks were an award fee with certain measurable milestones inclusive inside the award fee contract as I recall.

Q: On the DD-250s where it includes the estimated costs, does that include Lockheed’s profit or is that just costs?

A: It doesn’t include the profit to my knowledge.

Q: All right. In profits, okay, give me an approximation of where those profits range from for Lockheed. Are we talking 20 percent? Ten percent? Five percent? Two percent? What are those numbers approximately?

A: On average?

Q: Yes.

A: [] percentage.

final two external tanks were purchased, had a more complicated formula for establishing profit that appears to have yielded a slightly lower figure. Accounting reports for these two tanks suggest that the profit percentage for them ought to be slightly lower – say [] percent.¹⁷

C. Redux – The Royalty Calculation

Applying the 1.25 percent royalty rate to the royalty base identified above yields the following results:

<u>External Tank #</u>	<u>Date Shipped</u>	<u>Cost</u>	<u>Profit</u>	<u>Equivalent Sales Price</u> ¹⁸	<u>Royalty</u>	<u>Due Date for Royalty Payment</u> ¹⁹
96	01/12/98	[]	[]	[]	[]	7/30/98
97	03/30/98	[]	[]	[]	[]	7/30/98
98	06/04/98	[]	[]	[]	[]	7/30/98
99	07/27/98	[]	[]	[]	[]	1/30/99

Q: Okay. So is it fair to say that if the award was \$1.2 billion for this super lightweight tank that Lockheed received on top of the \$1.2 billion, if those were costs and I added those up from the 250s, another [] million?

A: The profit was not included in those numbers. That's correct.

Q: Okay. And I took [] percent as your average, and I took [] percent of the fee too and said [].

A: And I just agreed with you.

¹⁷ Unlike the Buy 5 contract, the Buy 6 contract was divided into sections, corresponding to different portions of Lockheed's reimbursable costs, each with its own unique fee structure. As such, the profit percentage for one section differed from that for another, and no one percentage was necessarily reflective of the total profits Lockheed earned on each tank. To estimate the profit per tank covered by the Buy 6 contract, the court used statistics from the May 2006 statement of operating profit prepared by Lockheed and then calculated an average profit by weighting the profits for each section of the contract to reflect the relative magnitude of reimbursed costs thereunder. This resulted in an average profit figure of [] percent, which the court has used in calculating profits on the last two tanks delivered by Lockheed.

¹⁸ Consistent with the definition employed in the prior licenses, the Equivalent Sales Price is derived by adding the cost and profit columns. The court considered reducing this price to account for freight costs, but did not do so because the cost of freight is not readily determinable from any of the cost records associated with the various tanks.

¹⁹ The due date for the royalty payments is derived by looking at the date the tank was transferred to NASA and then determining, under the prior licenses, when the corresponding royalty payment would have been owed.

100	11/25/98	[]	[]	[]	[]	1/30/99
101	11/25/98	[]	[]	[]	[]	1/30/99
102	02/01/99	[]	[]	[]	[]	7/30/99
103	06/22/99	[]	[]	[]	[]	7/30/99
104	06/01/99	[]	[]	[]	[]	7/30/99
105	07/16/99	[]	[]	[]	[]	1/30/00
106	12/17/99	[]	[]	[]	[]	1/30/00
107	10/12/99	[]	[]	[]	[]	1/30/00
108	02/10/00	[]	[]	[]	[]	7/30/00
109	05/03/00	[]	[]	[]	[]	7/30/00
110	07/26/00	[]	[]	[]	[]	1/30/01
111	09/22/00	[]	[]	[]	[]	1/30/01
112	03/08/01	[]	[]	[]	[]	7/30/01
113	04/30/01	[]	[]	[]	[]	7/30/01
114	06/18/01	[]	[]	[]	[]	7/30/01
115	09/26/01	[]	[]	[]	[]	1/30/02
116	11/28/01	[]	[]	[]	[]	1/30/02
117	02/04/02	[]	[]	[]	[]	7/30/02
118	04/05/02	[]	[]	[]	[]	7/30/02
119	05/28/02	[]	[]	[]	[]	7/30/02
120	07/22/02	[]	[]	[]	[]	1/30/03
121	09/24/02	[]	[]	[]	[]	1/30/03
122	11/21/02	[]	[]	[]	[]	1/30/03
123	01/23/03	[]	[]	[]	[]	7/30/03

The royalties reflected by these income flows total approximately \$16.9 million.²⁰ In assessing the reasonableness of this figure, the court is impressed that it represents a very small fraction not only of the cost of the additional launches that might have been necessary to complete the ISS but for the use of the patent (at approximately \$400 million per mission), but also of the launch costs of the shuttle missions in which the SLWTs were employed (which totaled approximately \$11.2 billion). Determining the actual amount to be recovered by plaintiff, of course, requires that these income flows be further adjusted to reflect the accumulation of prejudgment interest – a topic to which the court now turns.

²⁰ Defendant claims that the damages here ought to be reduced to reflect royalties paid by Alcoa pursuant to its license of the '682 patent. To be sure, the record includes checks and other indications that, during the periods in question, Alcoa paid approximately [] in royalties. While it is likely that some of these royalty payments relate to Alcoa's performance as a subcontractor on the external tank contract, there is no way to determine whether and to what extent this is the case. In the court's view, it was defendant's obligation, as the infringer, to provide evidence that a portion of its royalty obligation had already been satisfied. *See Nickson Indus., Inc. v. Rol. Mfg. Co., Ltd.*, 847 F.2d 795, 799 (Fed. Cir. 1988); *see also Westinghouse Elec. & Mfg. Co. v. Wagner Elec. & Mfg. Co.*, 225 U.S. 604, 620 (1912). Absent that proof, the court declines to reduce the royalty figures to account for the royalty payments made by Alcoa.

D. Interest Rate

The parties also disagree as to the amount of prejudgment interest that plaintiff is owed. Plaintiff would have this interest imposed at the tax overpayment rate established by 26 U.S.C. § 6621(a)(1), while defendant would have the court employ, for this purpose, the 52-week U.S. Treasury Bill rate.

The purpose of prejudgment interest is “to ensure that the patent owner is placed in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement.” *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 655 (1983); *see also* *Dynamics Corp. of Am. v. United States*, 766 F.2d 518, 520 (Fed. Cir. 1985).²¹ Although the rate of prejudgment interest and whether it should be compounded or un compounded are matters left largely to the discretion of the court, the purpose of prejudgment interest should guide the court in exercising that discretion. *Rite-Hite*, 56 F.3d at 1555; *Bio-Rad Labs., Inc. v. Nicolet Instrument Corp.*, 807 F.2d 964, 969 (Fed. Cir. 1986). Generally, the interest rate should be fixed as of the date of infringement, with interest then being awarded from that date to the date of judgment. *See Nickson Indus.*, 847 F.2d at 800. In this regard, the Supreme Court has explained that “[a]n award of interest from the time that the royalty payments would have been received merely serves to make the patent owner whole, since his damages consist not only of the value of the royalty payments but also of the foregone use of the money between the time of infringement and the date of the judgment.” *General Motors*, 461 U.S. at 655-56.

As noted in one case, “[i]n setting the rate for prejudgment interest courts have used: the prime rate, the prime rate plus a percentage, the U.S. Treasury bill rate, the state statutory rate, corporate bond rates, a set consumer credit rate, a set percentage rate, the rate the patentee actually paid for borrowed funds and others.” *Joy Techs., Inc. v. Flakt, Inc.*, 954 F. Supp. 796, 808 (D. Del. 1996); *see also* Chisum, *supra*, at § 20.03[4][a][v]. Nonetheless, a case survey indicates that the prime rate is often selected by courts where the patentee is a large, established and credit-worthy corporation.²² While “it is not necessary that a patentee demonstrate that it borrowed at the prime rate in order to be entitled to prejudgment interest at that rate,” *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 939 F.2d 1540, 1545 (Fed. Cir. 1991), selection of the prime rate

²¹ In 1946, Congress amended the Patent Act to authorize the award of “interest.” *See* Act of Aug. 1, 1946, ch. 726, §1, 60 Stat. 778, originally codified at 35 U.S.C. § 67, 70 and recodified under the Patent Act of 1952 as 35 U.S.C. § 284. In *General Motors*, the Supreme Court held that the 1946 amendment required the payment of prejudgment interest. 461 U.S. at 654.

²² *See* *Lam, Inc. v. Johns-Manville Corp.*, 718 F.2d 1056, 1066 (Fed. Cir. 1983); *Mobil Oil Corp. v. Amoco Chem. Corp.*, 915 F. Supp. 1333, 1372 n.24 (D. Del. 1994); *Exxon Chem. Patents, Inc. v. Lubrizol Corp.*, 30 U.S.P.Q.2d 1813, 1816 (S.D. Tex. 1994), *vacated on other grounds*, 64 F.3d 1553 (Fed. Cir. 1995), *cert. denied*, 518 U.S. 1020 (1996); *see also* *Studiengesellschaft Kohle*, 862 F.2d at 1579-80; *Universal Gym Equipment, Inc. v. ERWA Exercise Equipment, Ltd.*, 827 F.2d 1542, 1554 (Fed. Cir. 1987).

makes even more sense if it is consistent with the interest rate charged the patent holder for short-term, unsecured borrowing, *i.e.*, its cost of capital. *See Lam*, 718 F.2d at 1066; *see also* Roy J. Epstein, “Prejudgment Interest Rates in Patent Cases Don’t Compound an Error,” 24 No. 2 Intell. Prop. L. Newsl. 1, 9 (2006) (indicating that a licensor would be unlikely to lend money to the licensee at an interest rate below its cost of capital). A similar survey of the cases indicates that the courts most often compound interest, reflecting, in this regard, not only the expectation of a prudent, commercially reasonable investor, but also the way that post-judgment interest is calculated under 28 U.S.C. § 1961(c)(3). *See Hughes Aircraft*, 86 F.3d at 1575; *Dynamics Corp.*, 766 F.2d at 520; *see also Kirby Forest Indus. v. United States*, 467 U.S. 1, 10 (1984). While quarterly compounding is the most common convention employed in these cases, there is no dominant pattern. Several cases persuasively suggest that one of the factors bearing on this question should be how often the infringer would have been required to make royalty payments under the hypothetical agreement. *See, e.g., Datascope Corp. v. SMEC, Inc.*, 879 F.2d 820, 829 (Fed. Cir. 1989).

In the court’s view, use of the prime rate represents the most prudent course here. The 52-week U.S. Treasury bill rate, urged by defendant, would make sense if the sole purpose of providing prejudgment interest was to analyze the transaction as if the patentee had lent funds to defendant during the pendency of the litigation. *See In the Matter of Mahurker Double Lumen Hemodialysis Catheter Patent Litigation*, 831 F. Supp. 1354, 1394-95 (N.D. Ill. 1993). Yet, that approach fails to take into account how the patentee would have invested the funds had it received the royalties on a timely basis. The latter must also be accounted for if the patentee is to be made whole.²³ In the court’s view, using the prime rate more closely approximates the yield that Boeing would have expected had it received the royalties and reinvested them. It also provides a more reliable measure than the tax overpayment rate, which, for corporations, fluctuates depending upon the size of the tax overpayment (a consideration wholly unrelated to those controlling here). *See* 26 U.S.C. § 6621(a); *see also Gen. Elec. Co. & Subs. v. United States*, 384 F.3d 1307, 1309-10 (Fed. Cir. 2004).²⁴ Indeed, use of that rate arguably understates

²³ *See Gorenstein Enter., Inc. v. Quality Care-USA, Inc.*, 874 F.2d 431, 436 (7th Cir. 1989) (the patentee should be compensated not only for “the risk of default,” but also for “the loss of the use of their money”); *Brunswick Corp v. United States*, 36 Fed. Cl. 204, 218-19 (1996) (patentee is “entitled to receive that measure of compensation that would place it in the economic position it would have held had royalties been timely paid and prudently invested to produce return and preserve the principal”); *see also Mosinee Paper Corp. v. James River Corp. of Va.*, 22 USPQ2d 1657, 1664 (E.D. Wis. 1992), *aff’d*, 989 F.2d 1202 (Fed. Cir. 1993) (unpublished). Viewing the interest owed here in this theoretical fashion accords with the way that prejudgment interest is treated in the takings context. *See Petro v. United States*, 47 Fed. Cl. 136, 155 (2000); *see also United States v. Rogers*, 255 U.S. 163, 169-70 (1921).

²⁴ In arguing for application of the tax overpayment rate, plaintiff cites this court’s decision in *Hughes Aircraft*. It is notable, however, that, for the period that the interest was applied in that case (beginning in 1980) the interest rate provided by section 6621 was essentially set at the prime rate. *See* 26 U.S.C. § 6621 (1980).

somewhat the interest owed, given the extraordinarily positive investment climate that prevailed during the years in question – from 1994 to 2003. *See Andrew Corp. v. Gabriel Elecs., Inc.*, 785 F. Supp. 1041, 1055 n.14 (D. Me. 1992) (indicating that the court may take judicial notice of the general investment climate in determining an appropriate interest rate). Moreover, the court believes that the prejudgment interest should be compounded semiannually, on the 30th day of January and July of a given year, because the prior licenses involving the ‘682 patent required that royalties be paid on that periodic basis.

Defendant argues that if compounding is allowed here, interest should be calculated on an after-tax basis – with the royalty damages reduced to account for the payment of taxes in the year that they should have been received. It made a similar argument in *Hughes Aircraft Co. v. United States*, 31 Fed. Cl. 481 (1994), *aff’d*, 86 F.3d 1566 (Fed. Cir. 1996), asserting that “an award based on compound interest would provide a substantial benefit due to delayed federal income taxation” and proposing “an elaborate calculation to reduce the reward of interest for each year by the presumed amount of federal income taxation that would have been due.” 31 Fed. Cl. at 494. This court rejected this approach, noting, *inter alia*, that its adoption was inconsistent with various case law²⁵ and “would require findings concerning plaintiff’s actual tax situation for each applicable year . . . and speculation concerning actions which a reasonable recipient might have taken to reduce taxation on awards if received when due, *e.g.*, timing of charitable giving, carryforwards and carrybacks, anticipation of losses.” *Id.* at 494-95. The Federal Circuit affirmed this ruling, holding that this court “did not abuse its discretion” in concluding that “such reduction . . . would be speculative due to Hughes’ particular tax situation, including what actions Hughes might have taken to reduce such taxes in prior years.” 86 F.3d at 1575. Other cases have likewise refused to reduce royalty awards to account for taxes, noting that this approach could result in double taxation – once imposed in the calculation of the award and again

²⁵ Among the cases the court relied upon was *Hanover Shoe, Inc. v. United Shoe Mach. Corp.*, 392 U.S. 481 (1968). In that case, the Supreme Court reversed a decision of the court of appeals remanding an antitrust action to the district court for the deduction of taxes from a damages award to a corporate plaintiff. *Id.* at 502-03. The Supreme Court noted that damage awards are taxed when received and observed that –

to diminish the actual damages by the amount of the taxes that it would have paid had it received greater profits in the years it was damaged would be to apply a double deduction for taxation, leaving [the plaintiff] with less income than it would have had if [the defendant] had not injured it.

Id. at 503; *see also TP Orthodontics, Inc. v. Prof. Positioners, Inc.*, 1991 WL 187189 at *12 (E.D. Wisc. July 2, 1991), *aff’d*, 980 F.2d 743 (Fed. Cir. 1992) (“The *Hanover Shoe* rule has been followed in patent infringement cases.”).

in the year the judgment award is received.²⁶ While defendant's expert, Mr. Jarosz, apparently has long-championed this "after-tax" approach,²⁷ every indication is that it grossly underestimates the complexity of the Internal Revenue Code,²⁸ not to mention the ability of intrepid tax professionals to take advantage of that complexity in minimizing the taxes that would be paid on any currently received royalties.²⁹ This court will not labor under the same misconceptions, particularly as defendant stands to benefit not only from any additional taxes effectively imposed here, but also from any taxes imposed later.

²⁶ See, e.g., *Kalman v. Berlyn Corp.*, 914 F.2d 1473, 1482-83 (Fed. Cir. 1990); *Schnadig Corp. v. Gaines Mfg. Co., Inc.*, 620 F.2d 1166, 1169-72 (6th Cir. 1980) (rejecting this approach based on a variety of other tax complications); *Standard Mfg.*, 42 Fed. Cl. at 778 (noting that the after-tax "approach has previously been rejected for numerous reasons"); *Brunswick Corp.*, 36 Fed. Cl. at 219-20 ("[n]umerous courts have considered and declined to embrace the government's proposed taxation plan"); see also Chisum, *supra*, at § 20.03[1][d][iii] ("Because the damage award will be taxable, deduction would require the patentee to pay taxes twice."). The decisional law, of course, is clear in holding that amounts received as damages in patent infringement suits are includable as gross income in the year received. See, e.g., *Urquhart v. Comm'r of Internal Revenue*, 215 F.2d 17, 20 (3d Cir. 1954); *Mathey v. Comm'r of Internal Revenue*, 177 F.2d 259, 263 (1st Cir. 1949), *cert. denied*, 339 U.S. 943 (1950); *Fromson v. United States*, 32 Fed. Cl. 1, 6 (1994).

²⁷ See John C. Jarosz, *Pretax Versus After-Tax Damages: Do the Courts Have it Right?* 74 J. Pat. & Trademark Off. Soc'y 938 (1992); John C. Jarosz, *Considering Taxes in the Computation of Lost Business Profits*, 25 Creighton L. Rev. 41 (1991).

²⁸ *Inter alia*, it appears that Mr. Jarosz assumed, without reviewing Boeing's tax returns, that the royalties would have been taxed at the highest marginal corporate tax rate, unreduced by any deductions or credits. In addition, it is unclear how, if at all, he would account for the impact of the final award again being subjected to taxes in the year of receipt. Compare *Micro Motion Inc. v. Exac Corp.*, 761 F. Supp. 1420, 1435-36 (N.D. Cal. 1991) ("Although it finds [the] tax windfall theory quite interesting, the court declines to apply it in this case. First, [the accused infringer] failed to prove that [the patentee's parent corporation] paid taxes at the top marginal rate for corporations. Second, to be completely fair, a tax adjustment would have to take into account changes to a firm's entire tax burden, not just changes to its federal taxes. Such an inquiry which was not performed in this case, would add to the complexity of already difficult damage cases and could add significantly to the cost of litigating such actions."); *Polaroid Corp. v. Eastman Kodak Co.*, 1990 WL 324105 at * 83-84 (D. Mass. Oct. 12, 1990). The failure to do the latter, of course, would inevitably lead to some form of double taxation.

²⁹ One is reminded of the words of a preeminent tax professor – "The tax bar is the repository of the greatest ingenuity in America, and given the chance, those people will do you in." Hearings before the Subcomm. on Select Revenue Measures of the H. Comm. on Ways & Means, 97th Cong. 90 (1982) (stmt. of Prof. Martin D. Ginsburg).

III. CONCLUSION

This court need not go any further. Based on the foregoing, the court finds that plaintiff is entitled to damages owing to defendant's infringement of its patent, calculated, with reference to 28 U.S.C. § 1498, as follows:

1. A hypothetical licensing agreement will be deemed to have arisen on August 15, 1994, and to extend until external tank 123 was delivered in 2003.
2. The royalty rate for that agreement shall be deemed to be 1.25 percent of the royalty base, with the base and resulting royalties to be defined consistent with this opinion.
3. Prejudgment interest on these royalties shall be calculated using the prime rate for the applicable periods, compounded semiannually as described above.

On or before **April 17, 2009**, the parties shall file jointly a proposed judgment that incorporates the foregoing rulings. Defendant's agreement with this proposed judgment shall not be viewed as in any way affecting its appeal rights.

IT IS SO ORDERED.³⁰

s/ Francis M. Allegra
Francis M. Allegra
Judge

³⁰ It is the court's intention to unseal and publish this opinion after March 27, 2009. On or before March 26, 2009, each party shall file proposed redactions to this opinion, with specific reasons therefore.